



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/567,420	04/04/2007	Joseph Kennedy	H0004729.86589 USA -4780	9127
128 7590 03/16/2010 HONEYWELL INTERNATIONAL INC. PATENT SERVICES 101 COLUMBIA ROAD P O BOX 2245 MORRISTOWN, NJ 07962-2245			EXAMINER ISAAC, STANETTA D	
			ART UNIT 2812	PAPER NUMBER
			MAIL DATE 03/16/2010	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/567,420

Applicant(s)

KENNEDY ET AL.

Examiner

STANETTA D. ISAAC

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 December 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/C)
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date 10/12/09 & 11/10/09

DETAILED ACTION

This Office Action is in response to the amendment filed on 12/21/09. Currently, claims 1-32 are pending.

Information Disclosure Statement

1. The information disclosure statements (IDS) were submitted on 10/12/09 and 11/10/09 was filed after the mailing date of the Office Action on 9/22/09. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
4. Claims 1, 10-12, 14-18, 27-29, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Allman et al (US Patent 5,100,503, hereinafter referred to as "Allman") in view of Hussein et al (US Patent 6,365,529, hereinafter referred to as "Hussein").

5. Allman discloses the sacrificial coating material and method substantially as claimed.

See the corresponding text, where Allman shows, pertaining to claim 1, a sacrificial coating material comprising: at least one inorganic compound (col. 2, lines 55-58), and at least one material modification agent (col. 3, lines 39-45), wherein the sacrificial coating material is dissolvable in an alkaline-based chemistry or a fluorine-based chemistry (col. 5, lines 27-36).

6. Allman shows, pertaining to claim 18, a method of producing a sacrificial coating material, comprising: providing at least one inorganic compound (col. 2, lines 55-58), providing at least one material modification agent (col. 3, lines 39-45), combining the at least one inorganic compound with the at least one material modification agent to form the sacrificial coating material (col. 6, lines 7-20), wherein the sacrificial coating material is dissolvable in an alkaline-based chemistry or a fluorine-based chemistry (col. 5, lines 27-36).

7. Allman shows, pertaining to claims 10 and 27, wherein the at least one material modification agent comprises at least one porogen, at least one adhesion promoter, at least one densifying agent, at least one leveling agent, at least one high-boiling solvent, at least one catalyst, at least one pH tuning agent, at least one capping agent or at least one replacement solvent (col. 3, lines 39-45, adhesion promoter).

8. Allman shows, pertaining to claims 11 and 28, wherein the alkaline-based chemistry comprises an amine-based compound (col. 5, lines 27-36)

9. Allman shows, pertaining to claims 12 and 29, wherein the amine-based compound comprises a primary amine, a secondary amine, a tertiary amine or a combination thereof (col. 5, lines 27-36).

10. However, Allman fails to show, pertaining to claims 1 and 18, wherein the sacrificial coating material is transparent. In addition, Allman fails to show, pertaining to claims 14 and 31, a transparent via fill coating layer comprising the material. Also, Allman fails to show, pertaining to claims 15 and 32, wherein the layer is sacrificial. Allman fails to show, pertaining to claim 16, a layered material, comprising: the via fill coating layer, an absorbing composition layer, and a photoresist layer. Finally, Allman fails to show, pertaining to claim 17, wherein the layered material is coupled to a dielectric layer.

11. Hussein teaches, pertaining to claims 1, 18, 14-17, 31 and 32, using a sacrificial material in via for dual damascene metal interconnects that include use of dielectric layer material, where the sacrificial layer is transparent (figures 1c-1d; col. 6, lines 18-41). In addition, Hussein provides the advantages of reducing the amount of light reflected from the underlying substrate and eliminating defects of the dielectric material.

12. Therefore, it would have been obvious to one of ordinary skill in the art to incorporate the following steps of: wherein the sacrificial coating material is transparent; a transparent via fill coating layer comprising the material; wherein the layer is sacrificial; a layered material, comprising: the via fill coating layer, an absorbing composition layer, and a photoresist layer; wherein the layered material is coupled to a dielectric layer, with the sacrificial coating and method of Allman, pertaining to claims 14-17, 31, and 32, according to the teachings of Hussein, with the motivation of reducing the amount of light reflected from the underlying substrate and eliminating defects of the dielectric material allowing for a more efficient patterning process. In addition, both Allan and Hussein teach the use of spin-on glass materials thus would prove to be equivalent in the functionality of forming a sacrificial dielectric layer.

13. Claims 1-13 and 18-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kennedy et al (US Patent 6,506,497, hereinafter referred to as “Kennedy”) in view of Hussein et al (US Patent 6,365,529, hereinafter referred to as “Hussein”).

Kennedy discloses the sacrificial coating material and method substantially as claimed. See figures 1a-2h, and corresponding text, where Kennedy shows, pertaining to claim 1, a sacrificial coating material comprising: at least one inorganic compound (col. 2, lines 22-45), and at least one material modification agent (col. 3, lines 23-35; col. 6, lines 37-45), wherein the sacrificial coating material **24** is dissolvable in an alkaline-based chemistry or a fluorine-based chemistry (figures 2d-2f; col. 8, lines 16-35).

Kennedy shows, pertaining to claim 18, a method of producing a sacrificial coating material, comprising: providing at least one inorganic compound (col. 2, lines 22-45), providing at least one material modification agent (col. 3, lines 23-35), combining the at least one inorganic compound with the at least one material modification agent to form the sacrificial coating material **24** (2d-2f; col. 8, lines 13-35), wherein the sacrificial coating material is dissolvable in an alkaline-based chemistry or a fluorine-based chemistry (figures 2d-2f; col. 8, lines 16-35).

Kennedy shows, pertaining to claims 2 and 19, wherein the inorganic compound comprises a silicon-based compound (col. 2, lines 22-45).

Kennedy shows, pertaining to claims 3 and 20, wherein the silicon-based compound comprises at least one siloxane compound, at least one silazane polymer, dimethylsiloxane, diphenylsiloxane, methylphenylsiloxane, at least one silicate polymer, at least one silicic acid derivative, and mixtures thereof (col. 2, lines 22-45).

Kennedy shows, pertaining to claims 4 and 21, wherein the at least one siloxane compound comprises methylsiloxane, methylsilsesquioxane, phenylsiloxane, phenylsilsesquioxane, methylphenylsiloxane, methylphenylsilsesquioxane or combinations thereof. (col. 2, lines 22-45)

Kennedy shows, pertaining to claims 5 and 22, wherein the at least one silicon-based compound comprises at least one hydrogensiloxane polymer having the general formula $(H_{\text{sub}0-1.0}\text{SiO}_{\text{sub}1.5-2.0})_{\text{sub}x}$, at least one hydrogensilsesquioxane polymer having the formula $(H\text{SiO}_{\text{sub}1.5})_{\text{sub}x}$, where x is greater than about four and derivatives of silicic acid or a combination thereof (col. 2, lines 22-45).

Kennedy shows, pertaining to claims 6 and 23, wherein the at least one silicon-based compound comprises copolymers of hydrogensilsesquioxane and an alkoxyhydridosiloxane or hydroxyhydridosiloxane (col. 2, lines 22-45).

Kennedy shows, pertaining to claims 7 and 24, wherein the silicon-based compound comprises acrylic siloxane polymers, silsesquioxane-based polymers, derivatives of silicic acid, organohydridosiloxane polymers of the general formula $(H_{\text{sub}0-1.0}\text{SiO}_{\text{sub}1.5-2.0})_{\text{sub}n}(\text{R}_{\text{sub}0-1.0}\text{SiO}_{\text{sub}1.5-2.0})_{\text{sub}m}$, organohydridosilsesquioxane polymers of the general formula $(H\text{SiO}_{\text{sub}1.5})_{\text{sub}n}(\text{RSiO}_{\text{sub}1.5})_{\text{sub}m}$, where m is greater than zero and the sum of n and m is greater than about four and R is alkyl or aryl, and combinations thereof.

Kennedy shows, pertaining to claims 8 and 25 wherein the organohydridosiloxane polymer comprises methylhydridosiloxanes, ethylhydridosiloxanes, propylhydridosiloxanes, t-butylhydridosiloxanes, phenylhydridosiloxanes and combinations thereof (col. 2, lines 22-45).

Kennedy shows, pertaining to claims 9 and 26, wherein the silsesquioxane-based polymer comprises methylhydridosilsesquioxanes, ethylhydridosilsesquioxanes, propylhydridosilsesquioxanes, t-butylhydridosilsesquioxanes, phenylhydridosilsesquioxanes, and combinations thereof (col. 2, lines 22-45).

Kennedy shows, pertaining to claims 10 and 27 wherein the at least one material modification agent comprises at least one porogen, at least one adhesion promoter, at least one densifying agent, at least one leveling agent, at least one high-boiling solvent, at least one catalyst, at least one pH tuning agent, at least one capping agent or at least one replacement solvent (col. 3, lines 23-35; col. 6, lines 37-45, solvent).

Kennedy shows, pertaining to claims 11 and 28, wherein the alkaline-based chemistry comprises an amine-based compound (col. 8, lines 4-15).

Kennedy shows, pertaining to claim 12 and 29, wherein the amine-based compound comprises a primary amine, a secondary amine, a tertiary amine or a combination thereof (col. 8, lines 4-15).

Kennedy shows, pertaining to claims 13 and 30, wherein the amine-based compound comprises TMAH (col. 8, lines 8-15).

14. .However, Kennedy fails to show, pertaining to claim 1 and 18, wherein the sacrificial coating material is transparent.

15. Hussein teaches, pertaining to claims 1 and 18, using a sacrificial material in via for dual damascene metal interconnects that include use of dielectric layer material, where the sacrificial layer is transparent (figures 1c-1d; col. 6, lines 18-41). In addition, Hussein provides the

advantages of reducing the amount of light reflected from the underlying substrate and eliminating defects of the dielectric material.

16. Therefore, it would have been obvious to one of ordinary skill in the art to incorporate the following steps of: wherein the sacrificial coating material is transparent, in the method of Kennedy, pertaining to claims 1 and 18, according to the teachings of Hussein, with the motivation of reducing the amount of light reflected from the underlying substrate and eliminating defects of the dielectric material allowing for a more efficient patterning process. In addition, both Kennedy and Hussein teach the use of spin-on glass materials, thus would prove to be equivalent in the functionality of forming a sacrificial dielectric layer.

Response to Arguments

17. Applicant's arguments filed 12/21/09 have been fully considered but they are not persuasive. In the Remarks on pages 8-12:

18. Applicant raises the clear issue as to whether Allan and/or Kennedy alone or in combination with Hussein suggests having a transparent sacrificial coating material.

19. The Examiner takes the position that based on the combined teachings of Allan and/or Kennedy in view of Hussein, one of ordinary skill in the art would be able to substitute the spin-on glass transparent material, taught by Hussein, into Allan's and/or Kennedy's spin-on glass material for the purpose of reducing the amount of light reflected from the underlying substrate and eliminating defects of the dielectric material allowing for a more efficient patterning process.

Conclusion

20. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to STANETTA D. ISAAC whose telephone number is (571)272-1671. The examiner can normally be reached on Monday-Friday 9:30am -6:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Garber can be reached on 571-272-2194. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Stanetta Isaac
Patent Examiner
March 12, 2010

/Charles D. Garber/
Supervisory Patent Examiner, Art Unit 2812